

المراجعة رقم (1)

اختبار شهر مارس



Test 1 on March

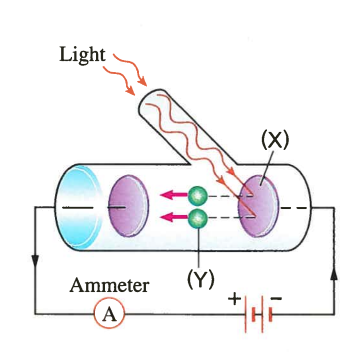
Choose the correct answer for the questions 1 : 9

1. 0.5 mol of the gas, which turns clear limewater milky, is consumed with (X) mol of the compound used in purifying the air in the closed areas to give (Y) mol of potassium carbonate and an amount of a gas which accelerates combustion.
Which of the following are the values of (X) and (Y) ?
   - (a) (X) : 0.5 mol , (Y) : 0.75 mol
   - (b) (X) : 1 mol , (Y) : 0.5 mol
   - (c) (X) : 0.6 mol , (Y) : 1 mol
   - (d) (X) : 0.5 mol , (Y) : 1 mol

2. $(NH_4)^+$ ion is similar to $(H_3O)^+$ ion in that they both ....
   - (a) are anions.
   - (b) contain only covalent bonds.
   - (c) are oxidizing agents.
   - (d) contain a bond formed by a lone pair of electrons of one of its atoms.

3. In which of the following compounds the angle between the covalent bonds is the largest ?
   - (a) CCl_4
   - (b) H_2S
   - (c) H_2O
   - (d) NH_3

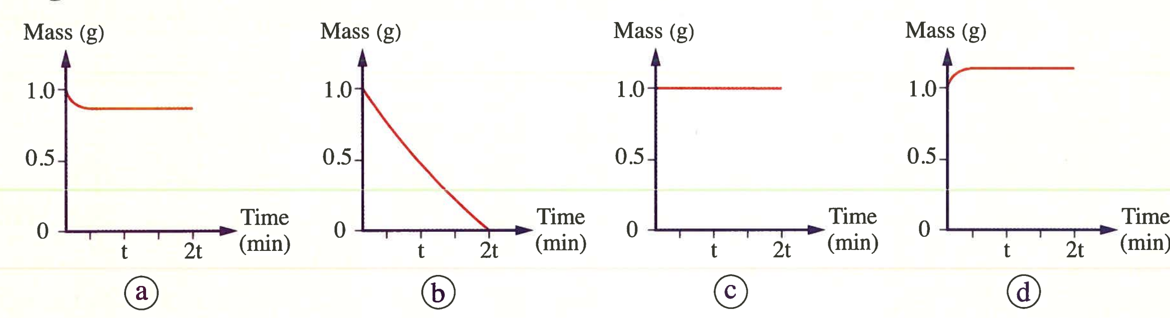
4. One of the phenomena which are studied by physical chemistry is illustrated in the opposite figure.
What is this phenomenon ?
What do (X) and (Y) indicate for ?



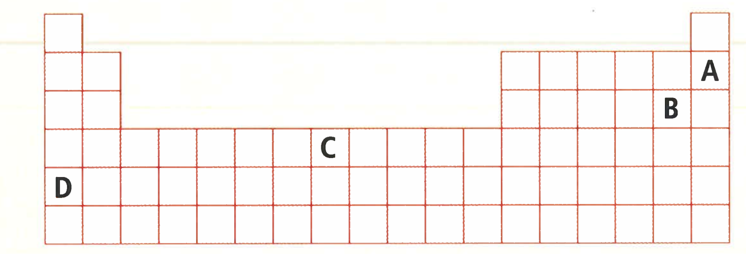
   - (a) Chemical passivity / (X) : Chromium / (Y) : Electron.
   - (b) Chemical passivity / (X) : Aluminum / (Y) : Aluminum oxide.
   - (c) Photo-electric / (X) : Lithium / (Y) : Proton.
   - (d) Photo-electric / (X) : Cesium / (Y) : Electron.

5. Water molecules in ice bind together by hydrogen bonds.
The following statements are correct, except ....
   - (a) ice melts at 0°C
   - (b) hydrogen bonds are longer than the covalent bonds in ice.
   - (c) hydrogen bonds are stronger than (O – H) bonds in ice molecules.
   - (d) number of hydrogen bonds is less than that of the covalent bonds in ice.

6. What is the graphical figure which represents the change in mass that happens when 1 g of sodium nitrate is heated strongly ?



7. The following table represents a section in the periodic table :



What is the letter which indicates the element that is characterized by its softness and its vigorous reaction with water ?

ⓐ A
ⓑ B
ⓒ C
ⓓ D

8. Two elements (X) and (Y) react together to form a compound whose formula is X_2Y, it dissolves in water forming a solution which is a good conductor of electricity. Which of the following represents (X) and (Y) ?

ⓐ (X) : Magnesium / (Y) : Chlorine.
ⓑ (X) : Sodium / (Y) : Sulphur.
ⓒ (X) : Oxygen / (Y) : Carbon.
ⓓ (X) : Nitrogen / (Y) : Oxygen.

9. What is the scientific explanation for the fact that the melting point of lithium (181°C) is higher than the melting point of sodium (98°C) ? This is because ....

ⓐ the number of valence electrons of lithium is higher than those of sodium.
ⓑ sodium is more active than lithium.
ⓒ sodium is softer than lithium.
ⓓ the attraction forces between the positive ions and the electron cloud which surrounds them are stronger in lithium than in sodium.

Answer the essay questions 10 : 12

10 **Determine the arrangement of** the electron pairs in the molecule whose central atom contains 2 bond pairs and 1 lone pair of electrons, **and write the abbreviation which represents this molecule.**

....

....

11 **What are the numbers and the types of** the bonds found in the molecule of NH_3BCl_3 ?

....

....

....

12 **A sample of an unknown solid salt** gives a crimson red colour during the flame test, when this sample is heated strongly to 1000°C, its weight decreases and a gas evolves which causes the clear limewater to turn milky.

(1) **Identify** each of the anion and the cation composing this salt.

- The anion : ....
- The cation : ....

(2) **What** is the reason for the decrease in the weight of the sample when it was heated till 1000°C ?

Write the balanced symbolic equation which represents this reaction.

....

....

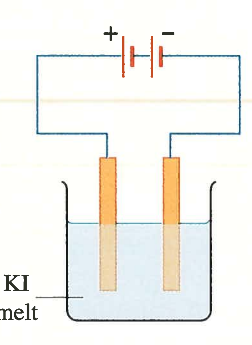
Test 2 on March

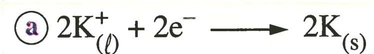
Choose the correct answer for the questions 1 : 9

1 2 pure samples of cesium and francium, the mass of each sample is 1 g, are left in a sealed vessel.
What is the mass of each sample after 40 min ?

ⓐ 1 g of Cs , 1 g of Fr
ⓑ 0.25 g of Cs , 0.5 g of Fr
ⓒ 1 g of Cs , 0.25 g of Fr
ⓓ 1.25 g of Cs , 1.5 g of Fr

2 The shown diagram illustrates the electrolytic cell used in the electrolysis of potassium iodide melt.
Which of the following reactions takes place at the cathode ?




ⓐ $2K^+_{(\ell)} + 2e^- \longrightarrow 2K_{(s)}$
ⓑ $2K_{(s)} \longrightarrow 2K^+_{(\ell)} + 2e^-$
ⓒ $2I^-_{(\ell)} \longrightarrow I_{2(s)} + 2e^-$
ⓓ $I_{2(s)} + 2e^- \longrightarrow 2I^-_{(\ell)}$

3 Four students speculated the following results when water is added to K_2O
Which choice represents the correct speculation ?

ⓐ Water freezes.
ⓑ A gas evolves.
ⓒ A precipitate is formed.
ⓓ An alkaline solution is formed.

4 In which of the following compounds the angle between the covalent bonds is the smallest ?

ⓐ NH_3
ⓑ H_2S
ⓒ SO_2
ⓓ CH_4

5 The metallic bond is type of ....

ⓐ ionic bonds.
ⓑ covalent bonds.
ⓒ electrostatic bonds.
ⓓ nonpolar covalent bonds.

6 When sodium is burnt in excess of oxygen gas, the compound (X) is formed which reacts with hydrochloric acid forming the products (Y).
Which of the following represents (X) and (Y) ?

ⓐ (X) : Na_2O / (Y) : $NaCl + H_2O$
ⓑ (X) : Na_2O_2 / (Y) : $NaCl + H_2O_2$
ⓒ (X) : NaO_2 / (Y) : $NaCl + H_2O_2 + O_2$
ⓓ (X) : NaO / (Y) : $NaOH$

7 Which of the following abbreviations represents a polar molecule whose stereostructure is angular ?

ⓐ AX_2E ⓑ AX_2 ⓒ AX_4 ⓓ AX_3E

8 Which of the following represents the components of the gunpowder used in explosives ?

ⓐ KNO_3 , $NaNO_3$, S ⓑ KNO_3 , C , S
ⓒ $NaNO_3$, S ⓓ $NaNO_3$, P , C

9 The arrangement of the electron pairs is similar in each of the following pairs of molecules, except ....

ⓐ PH_3 , BF_3 ⓑ CH_4 , CH_2Cl_2 ⓒ NH_3 , H_2O ⓓ CH_3Cl , $CHCl_3$

Answer the essay questions 10 : 12

10 **3 elements (X) , (Y) and (Z) :**

The dry test of the salt of each of them gives :

- Crimson in case of X^+
- Yellow in case of Y^+
- Pale violet in case of Z^+

Which of these elements emits electrons when it absorbs energy from the visible light ? **Explain.**

....

....

....

11 **What are the types of** the bonds found in a pure sample of :

(1) $_{13}X$ **(2)** $_{17}Cl$

....

....

12 Element (A) reacts with nitrogen gas yielding substance (B) which reacts with water to form lithium hydroxide and gas (C).

Write the symbolic equations which elucidate the reaction of :

(1) Element (A) to form substance (B).

....

(2) Substance (B) to form gas (C).

....



كيفية طباعة صفحات معينة من ملف معين

مثلا ازاى نطبع الصفحات من صفحة 4 الى صفحة 9



خطوة 1

خطوة 2
اختيار اسم الطابعة بتاعتك

خطوة 3
كتابة الصفحات المراد طباعتها
نكتب رقم 4 ثم نكتب الشرطة دي - ثم نكتب 9

خطوة 4
اختيار نوع الورق

خطوة 5
اختيار A4

خطوة 6

المراجعة رقم (2)

اختبار شهر مارس





3 – Co _ ordinate bond

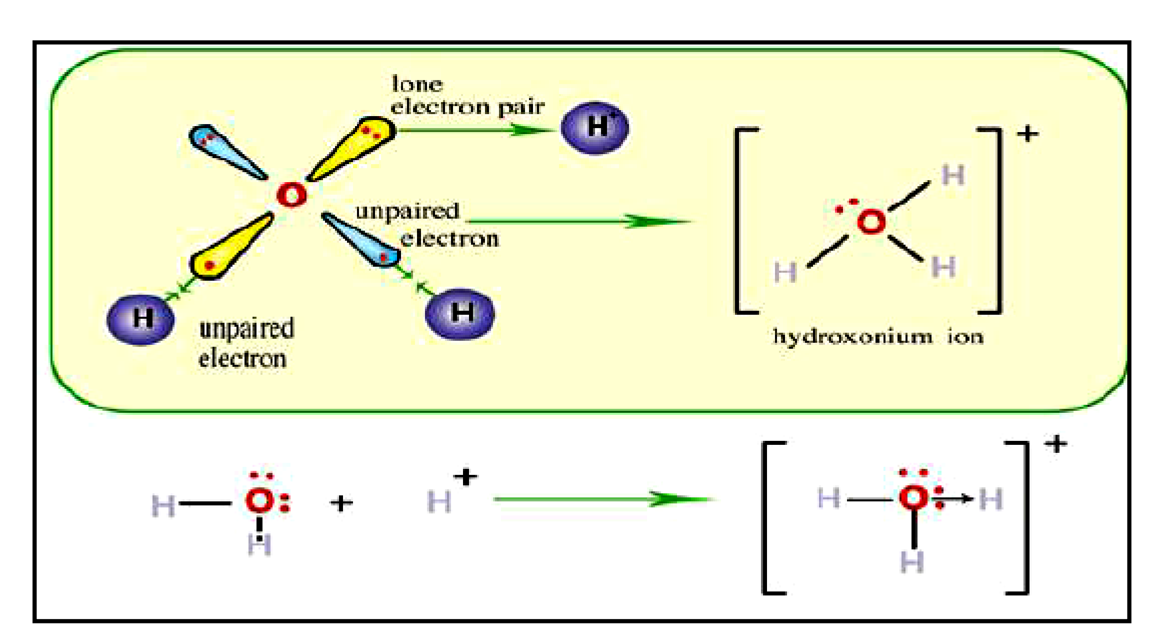
" is a type of covalent bond formed between 2 atoms on of theme has one Orbital containing alone pair of electrons which is called donor atom , while The other atom has a vacant orbital called acceptor atom '

<u>Note:</u>

The electron pair of the coordinate bond is a lone electron pair occupying one orbital found in one atom called the donor atom. This lone pair is donated to another atom having a vacant orbital

<u>Example:</u>

<u>(1) Hydronium ion (hydroxonium) $H3O^+$</u>



formed between the neutral water molecule and the positive hydrogen ion produced on dissolving acids in water, thus forming the hydroxonium ion (H30) + .

The coordinate bond is also formed in the ammonium ion $(NH4)^+$ when the proton H^+ accepts the lone electron pair from the nitrogen atom of the ammonia molecule.

<u>Give reason: proton of strong acid does not exist freely in water</u>

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Second: physical bonds

1-Hydrogen bond

Hydrogen bond
The bond which is formed between hydrogen atom binds by a polar bond { (F -H) , (O-H) , (N-H) }with high electronegative bonded atom (F,O,N)

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*is a bond formed between polar molecules in which hydrogen atoms lies between to atoms of high electronegativity as (oxygen) or (fluorine) , so the hydrogen atom binds with one atom by polar covalent bond and binds with the second atom by hydrogen bond .

****So hydrogen atom acts as a bridge to bind molecules together .**

Explanation of hydrogen bond in water :

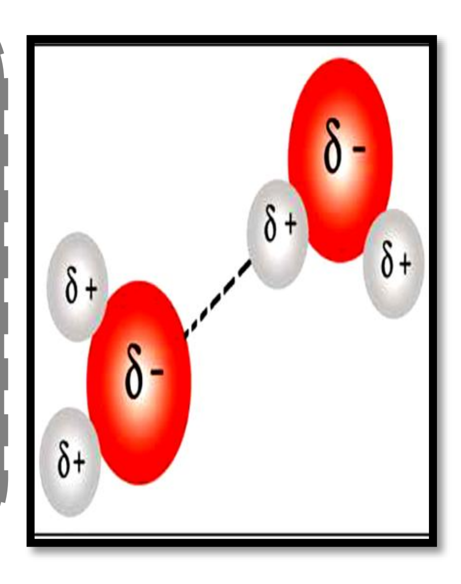
(1) oxygen atoms has small volume , so it has high electronegativity (3.5) , while electronegativity of hydrogen is 2.1 . so oxygen atom will carry a partial negative charge , while hydrogen atom will carry a partial positive charge .

(2) hydrogen bond is formed due to the attraction force between one hydrogen atom of one molecule and one molecule and one oxygen atom of another molecule , so molecule of water are collected by hydrogen bonds , so water exists in a liquid state and has high boiling point .

Give reason:

Although molecular weight of water (H2O) is very small (18) but it exists in a liquid state and boils at 100 C, while molecular weight of hydrogen sulphide (H2S) is (34) but it exists in a gaseous state and boils at (-61 C).

Answer: Due to the presence of big difference in E.N. between hydrogen and oxygen and so formation of hydrogen bond between molecules of water.



Give reason: the hydrogen bond between H2O molecules is stronger than that between NH3 molecules

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Properties of hydrogen bond:

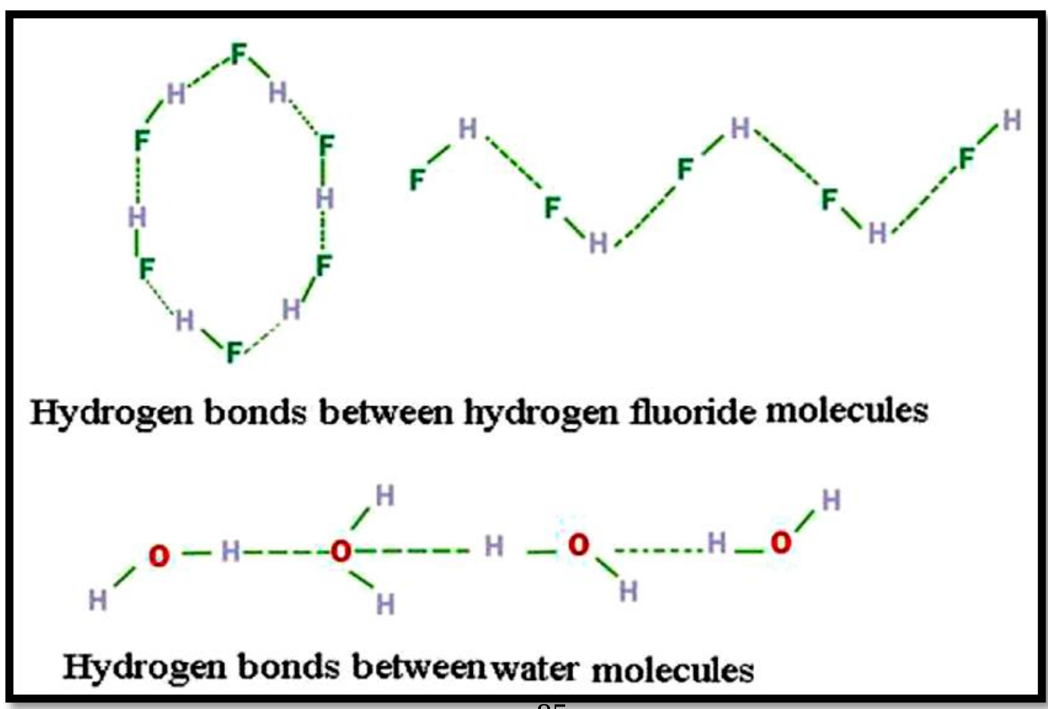
1- Strength of H-Bond depends on the difference in electronegativity increases, the strength also increases and the boiling point will be high as in water.

2- H-Bond is longer than covalent bond.

3- H-Bond is much weaker than covalent bond.

4- H-Bond has several forms:
   A- Straight line. B- Closed ring. C- Open net.

	Covalent bond	H2 Bond
Bond Length	1 A^0	3 A^0
Strength in (k.j)	418	21



Hydrogen bonds between hydrogen fluoride molecules

Hydrogen bonds between water molecules

2-Metallic bond

metallic bond

The bond which is formed from the electron cloud of valence electrons which decreases the repulsive forces between the positive metal ions in the crystal lattice

The bond which is formed from the electron cloud of valence electrons which decreases the repulsive forces between the positive metal ions in the crystal lattice

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The free valency electrons of the outer shell are associated together forming an electron cloud which decreases the repulsion force between (+ve) ions in the metallic structure.

- The strength of the metallic bond depends on no of free valnce electrons.
- As the no. of free valence electrons increases, the atoms of metal will be strongly bonded, so the metal will be harder, of higher melting & boiling points and higher thermal and electrical conductivity.

Give reason: elements of group IA as Na are soft and have low melting point while elements of group IIIA as Al are hard and have high melting point.

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Sheet 7

QUESTION 1:What is meant by:

1-Chemical reaction

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2- Ionic bond

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3-Covalent bond

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QUESTION 2:

Give reason for each of the following:

1-The molecules of noble gas are monoatomic.

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Group (1A) elements combine with group (7A) elements by ionic bonds.

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3- Molten sodium chloride conducts electricity more than magnesium chloride molten.

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4- The molecule of water is a polar molecule.

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....

....

5-The negative fluoride ion and the positive sodium ion are iso electronic.

....

....

....

6-CO_2 molecule is nonpolar, in spite of the presence of two polar covalent bonds in it.

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....

QUESTION 3:Choose the correct answer for each of the following sentences:

1- The hydrogen molecule is ……………

a) a mono- atomic molecule. b) a covalent molecule

c) soluble in water d) acidic

2- The molecule of the element with an electronic structure $1s^2$, $2s^2$, $2p^2$ consists of …………………… atom (s).

a) one b) two c) three d) four

3-The covalent bonding in methane molecules require ………… electrons.

a) 10 b) 8 c) 4 d) 2

4- The bond in hydrogen chloride is polar covalent bond , since the two atoms are different in ………….

a) their location in the periodic table. b) electron affinity .

c) electronegativity. d) ionization potential.

5- …………. has the highest boiling and melting point.

a) LiCl b) $AlCl_3$ c) $MgCl_2$ d) NaCl

6- Both of ………… had proposed the octet rule.

a) Kosel and Lewis. b) Guiguir and Mursiden.

c) Bohr and Rutherford. d) Dalton and Thomson.

7- The bond between hydrogen and oxygen in the water molecule is ………..

a) pure covalent b) coordinate c) ionic d) polar covalent

8- Three elements of atomic numbers C_{11}, B_{10}, A_9: the possible combination takes place between the atoms:

a- B with C b- A with B

c- b with it self d- C with A

9- When two atoms of an element of atomic no 9 combine together to form a molecule, the formed bond is:

b- metallic   b- coordinate   c- ionic   d- covalent

10-The bond in hydrogen fluoride molecule is polar covalent, because the atoms are different in :

a- location in periodic table   b- Electron affinity

c- Electronegativity   d- Ionization potential

QUESTION 4:Give the scientific term for each of the following:

1- A process in which bonds of the reactant molecules are broken and new bonds are formed between the product molecules.

2- The electron pair which is found in one of the outer orbitals and doesn't share in bond formation.

3- The electron pair which is responsible for the bond formation.

4- A metal atom loses one electron or more.

5- The bond that arises between two atoms one of them has small ionization energy and the other has a high electron affinity.

6- The bond arises between two atoms; the difference in electronegativity between them is less than 1.7

7- The covalent molecule whose sum of its polar pair moment equals zero.

8- The atoms of all elements tend to reach the octet structure of the nearest inert gas, with exception of hydrogen, lithium and beryllium.

Which of the following compounds conducts electricity? Giving reasons:

C_6H_6 , KCl , CH_4

QUESTION 5:-Answer the following:

a- Explain the expected bond in each of the following compounds.

KC1 - NO - SO_2- HC1 - CaO .

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b- Arrange the following bonds according to their polarity.

H-Cl , C=O , H-H , N-O , P-Cl .

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QUESTION 6:-

Explain using Lwies diagram bonding in:

1- Sodium with chlorine to from formula unit (NaCℓ).

2- Nitrogen with hydrogen to form ammonia molecule (NH_3).

QUESTION 7:-

Redraw structure of hydrazine molecule (N H) in front of you using dod dia-$_{2}$ $_{4}$ gram for electron pairs (lone and bonded):

H H

H N N H

Sheet 8

QUESTION 1:-

Choose the correct answer for each of the following sentences:

1- The hydrogen bond is ……….. the covalent bond.

a) longer than b) shorter than c) equal

d) half the length of

2- The metallic bond between aluminum atoms is ………… that between sodium atoms.

a) stronger than b) weaker than c) the same strength d) quarter

3- Hybridization process takes place between the orbitals of sublevels ………….

a) 1s , 1p b) 2s , 2p c) 5s , 3d d) 4d , 5p

4- The type of hybridization in the carbon atom of methane molecule is ……….

a) dsp^2 b) sp^3 c) sp^2 d) sp

5- The molecule takes ………. shape when the hybridization type in it is sp^2.

a) tetrahedron b) three – base pyramide

c) planar triangle d) angular

6- The angle between the hybrid orbitals sp in acetylene molecule is …………

a) 180° b) 109.5° c) 120° d) 107°

7- The compounds in which their molecules are bonded by hydrogen bonds ………..

a) are soluble in water b) have high boiling points

c) have different shapes d) (a) , (b) and (C)

8- The bond between hydrogen and oxygen in water molecules is a /an …… bond.

a) ionic b) pure covalent c) polar covalent d) hydrogen

9- Ammonium hydroxide contains ………… bond.

a) covalent b) coordinate c) ionic d) a , b and c

10- Ammonia molecule combines with positive proton by …….. bond.

a) ionic b) coordinate c) covalent d) metallic

QUESTION 2:-

Give the scientific term for each of the following:

1) The bond which is formed between hydrogen atom binds by a polar bond { (F -H) , (O-H) , (N-H) }with high electronegative bonded atom (F,O,N)

2) The bond which is formed from the electron cloud of valence electrons which decreases the repulsive forces between the positive metal ions in the crystal lattice
3) Overlapping between two different orbitals or more of the same atom to produce new orbitals having the same shape and energy.
4) The hybridization type produced from overlapping of one S orbital and one P orbital.
5) A carbon atom contains four single electrons.
6) is a type of covalent bond formed between 2 atoms on of theme has one Orbital containing alone pair of electrons which is called donor atom , while The other atom has a vacant orbital called acceptor atom
7) The shapes of molecules differ according to (free or non-bonded)electrons pairs which are found in the orbitals of the central atom in the covalent molecule , where the repulsion between them is the minimum to form the most stable shape of the molecules
8) A chemical bond formed between two atoms , one of them has a lone pair of electrons and the other has a vacant orbital.
9) A bond produced from the electron cloud of valence electrons which decreases the repulsive force between the positive metal ions in the crystal lattice.
10) A bond is responsible for the high boiling point of water molecules in spite of their low relative molecular mass.

QUESTION 3:- Give reason:

1- The octet rule can't be applied on both of boron tri fluoride molecule and phosphours penta chloride

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2- Sigma bond is stronger than pi bond.

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3- The angle between the two hybrid orbitals in C_2H_2 molecule equals 180°.

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4- There are on free positive hydrogen ions (protons) in the aqueous solutions of strong acids.

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5- The hydronium ion contains two types of bonds.

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QUESTION 4:-

Compare between:

1- Pi bond and sigma bond
2- Methane ,ethane and ethyne according to:
No. and type of hybridization, Angle between bonds and Stereo structure

QUESTION 5:-

Arrange the following metals in an ascending order according to: their melting points, giving reasons : **magnesium – sodium – aluminum**

QUESTION 6:-

Define The sterio Structure for the molecule which contains two bond pair and 1 lone pair with writing abbreviation expressing it.

QUESTION 7:-

Find number of bond pair, lone pair and also arrangement of electron pairs in the molecule which has abbreviation AX_2E.

Firstly: Elements of s-Block

The representative elements of some regular groups

Example: Elements of group (IA) (Alkali metals)

Elements of this group are known as alkali metals (forming alkalis)

The alkali metals group comprises six elements

Element	Symbol& At.no	Electronic distribution according to building up principle
Lithium	$_{3}Li$	$[He]_2\ 2S^1$
Sodium	$_{11}Na$	$[Ne]_{10}3S^1$
Potassium	$_{19}K$	$[Ar]_{18}4S^1$
Rubidium	$_{37}Rb$	$[Kr]_{36}5S^1$
Cesium	$_{55}CS$	$[Xe]_{54}\ 6S^1$
Francium	$_{87}Fr$	$[Ra]_{86}7S^1$

Abundance of alkali metal in nature:

1- Sodium and potassium are abundant elements in the earth crust.

They are the $6^{th}$and 7^{th} most common elements in the earth's crust.

a- The most important ore of sodium is Rock Salt (NaCℓ).

b- The most important ore of potassium is potassium chloride (KCl), which is found in seawater, and also in **carnallite** deposits: KCℓ.MgCℓ2 6H20

2- Other metals of this group are rare, **e.g. francium.a**

a- (Which is a radioactive element that was discovered in 1946) as a product of the disintegration of actinium.

$$^{227}_{89}Ac \longrightarrow\ ^{223}_{87}Fr +\ ^{4}_{2}He$$

b- It is a radioactive element

c- Its half life period is only twenty minutes.

General properties of the first group elements:

1- All elements of this group are characterized by the presence of one single electron on the outer energy level, (ns^1) accordingly:

a) Each element of this group is at the beginning of a new period

b) The oxidation number of all group (1 A) elements in their compounds is (+1).

c)They are chemically very active *Due to the ease of losing valence electron.*

d) Most of their compounds are ionic; the ion of each element is identical in electron structure to the noble gas which precedes it.

e) They are malleable metals

Since the number of electrons in the outer energy level in the metal atom is one so they have weak metallic bond.

So that they are the most, with the lowest melting and boiling points.

f) They are strong reducing agents.

g) So the first ionization potential is less than the ionization potential of any other element in the period.

h) The second ionization potential is very large**.(G.R)**

Since the second electron will be removed from a complete or saturated energy level which is stable.

2) Atoms of this group have the largest known volume

The volume of the atom increases down the group with increasing atomic number.

Due to the increase of the volume of the atom.

Alkali metals show the following properties :

a) An increase in the radius of the atom decreases the force of attraction between the valency electron and nucleus.
b) This electron can be lost easily, therefore these metals are considered of the highest electropositive and chemical reactivity**.(G.R)**

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c) The phenomenon of having a large volume of the atom and small ionization energy, is used in photo-electric cells as in potassium and Caesium. These elements when exposed to light, lose electrons from the outer surface of the metals; this is known as the photo electric phenomenon.

Photo electric phenomenon.

The phenomenon of losing electrons from the outer surface of the metals when they are exposed to light

G.R) potassium and Caesium are used in making photo-electric cells?

Low densities.

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These elements have very low electronegativity.

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3- When the electrons of these elements are excited to higher energy levels.

- They give the characteristic colours of these elements .
- This property is used in the dry test of these elements (flame test) in their compounds as the following:

Element	Colour
Lithium	Crimson
Sodium	Golden yellow
Potassium	Pale violet
Caesium	Bluish violet

1) The platinum wire is dipped in a concentrated hydrochloric acid ***to clean it.***
2) Then dip the platinum in the unknown salt and expose it to the non-illuminant Bunzen flame.
3) The flame will acquire the specific colour of cation.

4 - Due to the high activity of these elements they are kept out of air and humidity.

They are stored under liquid hydrocarbons e.g. kerosene. **(G.R)**

5- Action of atmospheric air:

All elements of this group are chemically active. They are oxidized easily in air. Lithium can react with nitrogen of theair giving lithium nitride, which itself reacts with water to evolve ammonia gas.

$$6Li_{(s)} + N_{2(g)} \xrightarrow{\Delta} 2Li_3N_{(s)}$$

$$Li_3N_{(s)} + 3H_2O_{(\ell)} \longrightarrow 3LiOH_{(aq)} + NH_{3(g)}$$

6- With water:

- Elements of this group are at the top of the electrochemical series.

  So they can replace the hydrogen of water.
- The reaction is accompanied by the evolution of a large amount of energy, which leads to the burning of the hydrogen evolved.
- The reaction becomes more vigorous down the group and with cesium an **explosion occurs.**

$$2Na_{(s)} + H2O_{(\ell)} \longrightarrow 2NaOH_{(aq)} + H2_{(g)}$$

We Can't extinguish burning sodium fires with water?

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7- With oxygen:

When these elements are burnt, they give three types ofoxides.

1- Lithium gives the normal oxide (Li_2O)

In which the oxidation number of oxygen is (-2).

2- Sodium gives sodium peroxide (Na_2O_2), which gives peroxide ion $(O_2)^{-2}$

The oxidation number of oxygen in this compound is (-1).

3- Potassium, rubidium, and caesium give super oxides

e.g. oxidation number of oxygen is (-½).

$$\underset{(s)}{4Li} + \underset{(g)}{O_2} \xrightarrow{180^\circ C} \underset{(s)}{2Li_2O} \text{ (Lithium oxide)}$$

$$\underset{(s)}{2Na} + \underset{(g)}{O_2} \xrightarrow{300^\circ C} \underset{(s)}{Na_2O_2} \text{ (Sodium peroxide)}$$

$$\underset{(s)}{K} + \underset{(g)}{O_2} \xrightarrow{300^\circ C} \underset{(s)}{KO_2} \text{ (potassium superoxide)}$$

Both peroxides and super oxides compounds act as a strong oxidizing agents, **<u>(G.R)</u>**

<u>As they react with water and acids giving hydrogen peroxide and oxygen</u>

$$\underset{(s)}{Na_2O_2} + \underset{(aq)}{2HC\ell} \longrightarrow \underset{(aq)}{2NaC\ell} + \underset{(aq)}{H_2O_2}$$

$$\underset{(s)}{2KO_2} + \underset{(aq)}{2HC\ell} \longrightarrow \underset{(aq)}{2KC\ell} + \underset{(aq)}{H_2O_2} + \underset{(g)}{O_2}$$

Potassium super oxide reacts with carbon dioxide giving oxygen.

$$\underset{(s)}{4KO_2} + \underset{(g)}{2CO_2} \xrightarrow[\text{catatyst}]{CuCl_2} \underset{(s)}{2K_2CO_3} + \underset{(g)}{3O_2}$$

(G.R)Potassium super oxide is used in purifying closed atmospheres such as submarines or air planes?

<u>Bec. It is used in replacing carbon dioxide by oxygen</u>

Note:

The normal oxide of these elements isX_2O

8- With acids:

These metals can replace the hydrogen in acids. It is such a vigorous reaction.

$$2Na(s) + 2HC\ell(aq) \longrightarrow 2NaC\ell(aq) + H_2(g)$$

9- With hydrogen:

Alkali metals react with hydrogen giving hydrides.

$$2Li(s) + H_2(g) \longrightarrow 2LiH(s)$$ Lithium hydride

$$2Na(s) + H_2(g) \longrightarrow 2NaH(s)$$ Sodium hydride

Hydrides are reducing agent (G.R)

Bec. they react with water and hydrogen gas evolve

$$LiH(s) + H_2O(l) \longrightarrow LiOH(aq) + H_2(g)$$

Hydrides:

They are ionic compounds in which hydrogen has oxidation no.(- 1)

10- With halogens :

Alkali metals react vigorously with halogens forming very stable ionic halides.

$$\underset{(s)}{2Na} + \underset{(g)}{C\ell} \longrightarrow \underset{(s)}{2\ NaC\ell}$$

$$\underset{(s)}{2K} + \underset{(l)}{Br} \longrightarrow \underset{(s)}{2\ KBr}$$

11 - With other non-metals:

Hot alkali metals can react directly with sulphur and phosphorus

$$2Na(s) + S(s) \longrightarrow Na_2S(s)$$ sodium suiphide

$$3K(s) + P(s) \longrightarrow K_3P(s)$$ potassium phosphide

12 - The action of heat on alkali metal oxygenated salts:

Alkali metal oxygenated salts are thermally stable

a) All alkali metal carbonates do not decompose when heated ,except lithium carbonate which decomposes at l000 C .

$$Li_2CO_3(s) \xrightarrow{1000\ C^o} Li_2O(s) + CO_2(g)$$

b) Alkali metal nitrates decompose partially giving a metal nitrite and oxygen.

$$2NaNO_3(s) \xrightarrow{\triangle} 2NaNO_2(s) + O_2(g)$$

(G.R) potassium nitrate is used in the manufacture of bombs ?

Bec. An explosion takes place when decomposes by heat.

(G.R)Sodium nitrate is not used to make bombs?

Because it is deliquescent which absorbs water vapour from air .

…………………………………………………………………………………………

Extraction of alkali metals from of their ores

Elements of this group are the most powerful reducing agents, i.e. these metals are easily lose their valence electrons .

These elements are not found in nature in a free state, **(G.R)**

………………………………………………………………………………………..

Compounds like sodium chloride (NaCℓ). Usually the preparing of these metals involves the ***electrolysis of its molten (fused) halide in the presence of a flux*** substance to decrease the melting point of these halides.

Example:

At cathode $2Na^+ + 2e^- \longrightarrow 2Na$

At anode $2C\ell^- \longrightarrow C\ell_2 + 2e^-$

Commonly used sodium compounds:

(1)Sodium Hydroxide NaOH

A) Properties:

1- A white hygroscopic solid compound ***(G.R)***

(Bec .it absorbs water vapour from atmospheric air).

2- It has a soapy touch and a corrosive effect on skin.

3- It dissolves easily in water forming an alkaline solution through an exothermic dissolution .

4- It reacts with acids forming the sodium salt of the acid and water.

$$\underset{(aq)}{NaOH} + \underset{(aq)}{HC\ell} \longrightarrow \underset{(aq)}{NaC\ell} + \underset{(\ell)}{H_2O}$$

$$\underset{(aq)}{2NaOH} + \underset{(aq)}{H_2SO_4} \longrightarrow \underset{(aq)}{Na_2SO_4} + \underset{(\ell)}{2H_2O}$$

B) Uses:

1- Sodium hydroxide is used in many important industries such as: Soap, synthetic silk and paper.

2- It is used to purify petroleum from the acidic impurities.

3- Detection of basic radicals (cations):-

a- Detection of copper (II) (Cu^{++}).

Salt solution + sodium hydroxide solution gives a blue precipitate of copper (II) hydroxide (blue ppt.) - turns black on heating. ***(G.R)***

(Due to the formation of CuO)

$$CuSO_4(aq) + 2NaOH(aq) \longrightarrow Na_2SO_4(aq) + \underset{\text{blue ppt}}{Cu(OH)_2(s)}$$

$$Cu(OH)_2(s) \xrightarrow{\text{Heat}} H_2O(v) + \underset{\text{Black ppt}}{CuO(s)}$$

(G.R) a blue ppt. is formed by adding sodium hydroxide solution to copper sulphate, which turns into black by heating?

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b- Detection of Aluminium Al^{+3}:

Salt solution + sodium hydroxide solution gives a white precipitate of Aluminum hydroxide dissolves in excess reagent to form the soluble sodium meta aluminate.

$A\ell C\ell 3(aq) + 3NaOH(aq) \longrightarrow 3NaC\ell\ (aq) + A\ell(OH)_3(s)$ white PPt

$A\ell(OH)_3(s) + NaOH(aq) \longrightarrow NaA\ell O_2(aq) + 2H_2O(l)$

Sodium metaluminate (soluble)

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(2) Sodium Carbonate Na2 CO3

A- Preparation:

1- In laboratory:

By passing **carbon dioxide** gas through a hot solution of **sodium hydroxide** the solution is left to cool, white crystals of hydrated sodium carbonate are separated gradually.

$2NaOH(aq) + CO_2(g) \longrightarrow Na_2CO_3(aq) + H_2O(l)$

The hydrated salt of sodium carbonate is known as washing *soda $Na_2CO_3.10H_2O$.*

Because it's used in removing water hardness which is produced due to presences of Ca^{2+} , Mg^{2+} salts soluble in water, as washing soda reacts with them producing water insoluble calcium and magnesium carbonate so hardness is removed.

$$Na_2CO_3(aq) + CaSO_4(aq) \longrightarrow Na_2SO_4(aq) + CaCO_3(s)$$

$$Na_2CO_3(aq) + MgSO_4(aq) \longrightarrow Na_2SO_4(aq) + MgCO_3(s)$$

2- In Industry: (Solvay process) :

By passing ammonia and carbon dioxide gases in a saturated aqueous solution of sodium Chloride to produce sodium bicarbonate. Heating sodium bicarbonate, itwill to sodium carbonate, water and carbon dioxide. heat

$$NH_{3(g)} + CO_{2(g)} + NaC\ell_{(aq)} + H_2O_{(\ell)} \longrightarrow NaHCO_{3(aq)} + NH_4C\ell_{(aq)}$$

$$2NaHCO_3(aq) \xrightarrow{\text{heat}} Na_2CO_3(aq) + CO_2(g) + H_2O(v)$$

b- Properties:

1- White powder, easily dissolves in water . Its solution has an alkaline effect.

2- It is not affected by heat i.e. it melts without decomposition.

3- It reacts with acids , and carbon dioxide evolves .

$$Na_2CO_3(s) + 2HCl(aq) \longrightarrow 2NaCl(aq) + H_2O(\ell) + CO_2(g)$$

c- Uses:

1- Manufacture of glass .
2- Paper industry.
3- Textile industry.
4- Water softening

Biochemical role of sodium:

It plays an important role in the vital processes ***(G.R)***

Because it forms a suitable medium for transferring nutrients like glucose and amino acids.

From the natural sources of sodium:

Vegetables (especially celery), milk and its products.

Biochemical role of potassium:

Plays an important role in the process of oxidation of glucose inside the cell to produce energy needed for it's activity.

From the natural source of potassium : meats , milk , eggs, vegetables and cerials.

Sheet 8

Choose the correct answer for each of the following sentences:

1- ……….. is from the radioactive elements.

a) Rabidium b) Sodium c) Francium d) Cesium

2- …………. elements react together vigorously and the produced product is more stable.

a) Lithium and chlorine b) Sodium and bromine

c) Calcium and oxygen d) Potassium and fluorine

3- Sodium metal is kept in ……………

a) sulphuric acid b) sodium hydroxide solution

c) water d) liquid hydrocarbons

4- Sodium nitrate decomposes thermally producing ………. gas.

a) NO b) NO_2 c) N_2O d) O_2

5- All alkali carbonates melt by strong heating without decomposition except …………. carbonate.

a) lithium b) sodium c) potassium d) cesium

6- In the presence of a catalyst , potassium superoxide is used to purify the atmosphere from …………. gas.

a) CO_2 b) H_2S c) O_2 d) H_2

7- Hydrated sodium carbonate salt is known as …………

a) baking soda b) washing soda c) caustic soda d) limewater

8- Solvay succeeded in preparing sodium carbonate from …………

a) sodium hydroxide b) table salt c) sodium carbon d) potassium chloride

9- Alkali metals are distinguished by the largeness of their …………..

a) densities b) ionization potentials c) atomic radii d) electro negativities

10- The ideal oxide to alkali element (M) is …………

a) M_2O_2 b) MO c) M_2O d) M_2O_3

11- Alkali elements do not combine with nitrogen gas except ……….. element.

a) lithium b) sodium c) potassium d) cesium

12- When CO_2 passes in hot sodium hydroxide solution and left to cool gradually , crystals from …………… are separated.

a) caustic

b) sodium bicarbonate

c) anhydrous sodium carbonate

d) washing soda

Give reason for each of the following:

1- The first ionization potential of the alkali metals is small while their second ionization potential is large.

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2- The alkali elements are strong reducing agents.

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3- Sodium is kept in kerosene.

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4- The reaction of potassium with hydrochloric acid is not allowed in the school lab.

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5- A white precipitate is formed when sodium hydroxide solution is added to aluminum chloride solution and the precipitate disappears when more sodium hydroxide is added.

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6- A blue precipitate which converts into black by heating is formed when sodium hydroxide is added to copper sulphate solution.

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Write the scientific term for each of the following statements :

1- Ionic compounds that contain hydrogen at the oxidation state (-1).

2- The phenomenon of liberating electrons from the outer surface of alkali metals when light falls on it.

3- The method used to prepare alkali metals from their molten halides in industry.

4- The method used to prepare sodium carbonate in industry .

5- The nitrate salt which is used in manufacturing bombs.

5- A compound used in purifying closed atmospheres.

Show by balanced chemical equations:

1- The product of dissolving sodium in water.

2- The product of dissolving carbon dioxide in water.

3- The product of dissolving sulphur trioxide in water.

4- The reaction between sodium oxide and sulphuric acid.

5- The reaction between magnesium oxide and sulphuric acid.

Show by balanced chemical equations:

1- The effect of heat on each of the following:

a. potassium nitrate

b. lithium carbonate

c. sodium carbonate

d. washing soda

e. copper II hydroxide

f. sodium bicarbonate

How can you differentiate practically between each of the following?

1- Lithium carbonate salt and sodium carbonate salt.

2- Potassium chloride salt and cesium chloride salt.

3- Sodium hydroxide solution and ammonium hydroxide solution.

4-Sodium carbonate salt and calcium carbonate salt.

Secondly: Elements of p-Block - Group 5 A (Group 15)

This group consists of five elements, they are:

Element	Symbol- At-no	Electronic distribution
Nitrogen	$_{7}N$	$[He]_{2}\ 2S^2\ 2p^3$
Phosphorus	$_{15}P$	$[Ne]_{10}3S^2 3P^3$
Arsenic	$_{33}AS$	$[Ar]_{18}4S^2\ 3d^{10}\ 4p^3$
Antimony	$_{51}Sb$	$[Kr]_{36}\ 5S^2\ 4d^{10}\ 5p^3$
Bismuth	$_{83}Bi$	$[Xe]_{54}\ 6S^2\ 4f^{14}\ 5d^{10}\ 6p^3$

Abundance in nature:

Elements of this group are not abundant,

a) Except nitrogen which constitutes about 80 % of atmospheric air.(4/5 of air volume)

b) Phosphorus is the most abundant element of this group in the earth's crust. It is found in the form of phosphates
E.g. calcium Phosphates $Ca_3(PO_4)_2$, apatite CaF_2-$Ca_3(PO_4)_2$.

c) Arsenic, antimony and bismuth .are found in the form of sulphides . As (As_2S_3, Sb_2S_3, and Bi_2S_3) .

....

General properties of Group 5 A elements (Group 15)

1- The properties of group tend to be those of non metals but metallic properties increase with increasing of atomic number. Nitrogen and phosphorus are non metal, arsenic and antimony are metalloids; but bismuth is a metal,

But its ability to conduct electricity is weak.

2- A nitrogen molecule contains two atoms.

But in phosphorus, arsenic and antimony, their vapours have molecules which contain four atoms (P_4,As_4 ,Sb_4).

-Bismuth forms a metallic crystal lattice,

But its vapour consists of diatomic molecules Bi2.

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(G.R) although bismuth is a metal atom but it has different properties than that of other metals?

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3- Elements of this group are characterized by having several oxidation numbers in their different compound; from (- 3) to (+5). ***(G.R)***

Bec It may gain 3 electrons through or lose five electrons.

the oxidation numbers of nitrogen in the oxygenated compounds are positive while in the hydrogenated compounds are negative ? ***(G.R)***

Bec. the electronegativity of nitrogen is greater than that of hydrogen and less than that of oxygen

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Allotropy:

"The presence of the element in more than one form, of different physical properties, but of similar chemical ones".

Solid nonmetals are characterized by allotropy.

The allotropic phenomena

Due to the presence of the element in different crystalline forms, each form differs in the number of atoms and in their arrangement.

(G.R) Both nitrogen and bismuth, have no allotropic forms ?

Bec. Nitrogen is gas not solid, while bismuth is a metal not non metal

4- *With oxygen :*

All elements of this group from oxides; as the following:

- Some are acidic N_2O_5,
- others are Amphoteric($Sb_2\ O_3$)
- basic.(Bi_2O_5) .

Note:

The basic property increases with increasing atomic number, and the acidic property decreases with increasing of the atomic number.

5- *With hydrogen :*

Most of the elements of this group form hydrides (Compounds with hydrogen) the oxidation number being (-3) as:

Ammonia (NH_3)Arsine (AsH_3) and PH_3 phosphine .

Ammonia is more basic than phosphine .

Note:

The polarity of hydrogen compounds in this group decreases with increasing atomic number .

Thus , *their solubility in water decreases* ***(G.R)***

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Their thermal stability decreases so, they decompose even by gentle heating.

المراجعة رقم (3)

اختبار شهر مارس





III – Co – ordinate bond :-

" is a type of covalent bond formed between 2 atoms on of theme has one Orbital containing alone pair of electrons which is called donar atom , while The other atom has a vacant orbital called acceptor atom '

The lone pair of electrons are original from one atom .

Example :

(1) hydronium l on (hydroxonium) H_3O^+

Is formed when a strong acid dissolved in water :

(donor) (proton acceptor) (Hydronium ion)

H °x O (xx above, xx below) x° H + H^+ ⟶ [H (top), H °x O (xx above, xx below) x° H]

Give reason: proton of stong acid does not exist freely in water

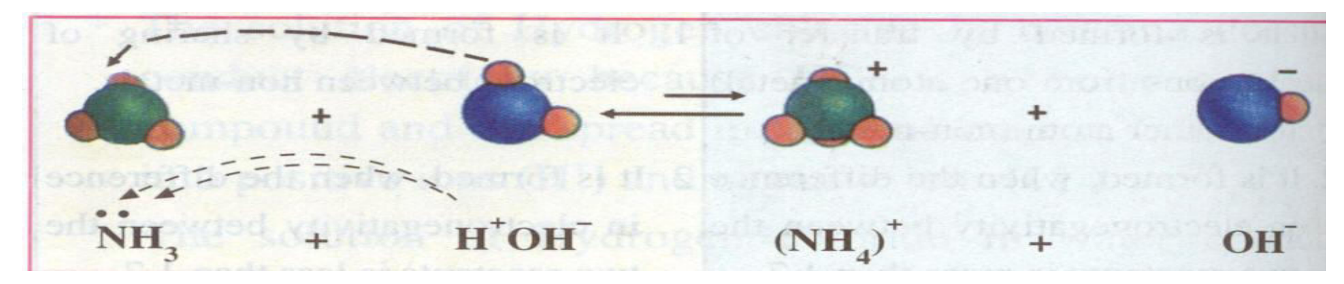
(3) Ammonium lon (NH_4) + :

-in the last example , proton is acceptor while central atom is donor like oxygen in H_3O^+ , phosphorous in PH_4^+ & nitrogen in NH_4^+.

-also types of bonds in the last examples are polar covalent and co – ordinate bonds .

Q : compare between covalent and co-ordinate bonds .

Definition with examples .



IV – Hydrogen bond :

*is a bond formed between polar molecules in which hydrogen atoms lies between to atoms of high electron gativity as (oxygen) or (fluorine) , so the hydrogen atom binds with one atom by polar covalent bond and binds with the second atom by hydrogen bond .
**So hydrogen atom acts as a bridge to bind molecules together .

Explanation of hydrogen bond in water :

(1) oxygen atoms has small volume , so it has high electronegativity (3.5) , while
electronegativity of hydrogen is 2.1 . so oxygen atom will carry a -8 charge ,
while hydrogen atom will carry a (+ s) charge .
(2) hydrogen bond is formed due to the attraction force between one hydrogen atom of one molecule and one molecule and one oxygen atom of another molecule , so molecule of water are collected by hydrogen bonds , so water exists in a liquid state and has high boiling point .

−2δ +δ −2δ +δ

O — H ...... O H

+δ H +δ H

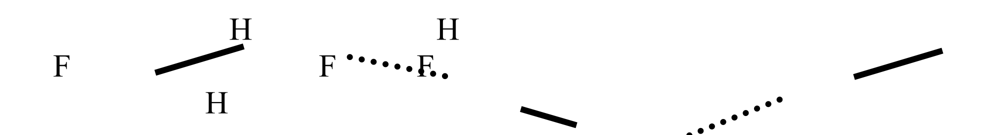
Give reason: Although molecular weight of water (H2O) is very small (18) but it exists
in a liquid state and boils at 100 C, while molecular weight of hydrogen
sulphide (H2S) is (34) but it exists in a gaseous state and boils at (-61 C).

Answer: Due to the presence of big difference in E.N. between hydrogen and oxygen
and so formation of hydrogen bond between molecules of water.





- **Hydrogen Bond in HF:**



<u>Give reason</u>: Although sugar is covalent compound but it dissolves in water.

<u>Answer</u>: Due to formation of H2 bond between hydroxyl group of sugar & oxygen of H2O, but its solution is a bad conductor of electricity because it can't be ionized.

- <u>Properties of hydrogen bond:</u>

1. **Strength of H-Bond depends on the difference in electronegativity increases, the strength also increases and the boiling point will be high as in water.**

2. **H-Bond is longer than covalent bond.**

3. **H-Bond is much weaker than covalent bond.**

4. **H-Bond has several forms:**

   A- Straight line. B- Closed ring. C- Open net.

	Covalent bond	H2 Bond
B.L.	1 A	3 A
Strength in (k.j)	418	21

<u>V- Metallic Bond (between atoms of metal in the metallic structure):</u>

"Is formed from electron cloud of the free valence electrons around (+ve) metal ions."

- **The free valency electrons of the outer shell are associated together forming an electron cloud which decreases the repulsion force between (+ve) ions in the metallic structure. The strength of the metallic bond depends on no of free valnce electrons. As the no of free valence electrons increases, the atoms of metal will be strongly bonded, so the metal will be harder, of higher melting & boiling points and higher thermal and electrical conductivity.**

- **Give reason:** elements of group IA as Na are soft and have low melting point while
  elements of group IIIA as AI are hard and have high melting point.

- **Answer:** In case of Na: due to weak metallic bond which depends only on one
  electron from ns, while in case of Al: due to strong metallic bond which
  depends on three valency electrons of ns, np.

Give reason: elements of 1st transition series are hard except Cu is relatively soft and has low melting point.

Answer: in case of T.E: due to strong metallic bond as it depends on electrons of 4s & 3d but Cu_{29} ( ) due to weak metallic bond which bond which depends only on one electron of 4S.

- Explain types of bond in the following:

  Nacl water hydronium ion chlorine molecule
  Iron Aluminum Ammonium chloride Hydrogen Fluoride

- Note:
  - Ionic compounds dissolve in polar solvent (H2O).
  - Polar compounds as HCL dissolve in polar and non polar solvents.

Chapter 4

The main group elements of the periodic table

1- S – Block elements : elements of group I Alkali metals .
2- P – Block elements : elements of group V.A

First : elements of S – Block

Elements of (1A) group :
Elements of (1A) group are considered as alkali metals because their oxides dissolve in water easily forming strong Alkalis .

1- Lithium ⟶ Li ⟶ no using
2- Sodium ⟶ Na ⟶ Rock salt (NaCl)
3- Potassium ⟶ K ⟶ in sea water KCl and carnallite ($KClMgCl_2.6\ H_2O$) .
4- Rubidium ⟶ Rb ⟶ no using
5- Caesium ⟶ Cs ⟶ no using
6- Franciuim ⟶ Fr ⟶ Radioactive element it is produced from diseintigration of actinium

$${}_{89}Ac^{227} \longrightarrow {}_{87}Fr^{223} + {}_{2}He^{4}$$

General properties of elements of group 1A

1- Every element consists of one electron in the outer most energy level they are characterized by :
A- Every element lies in the beginning of new period .
B- Oxidation number in their compounds is equal (1+).
C- They are chemically very active due to the presence of one electron in the outer mast energy level which can by easily lost and they have very low ionization potential .
D- The first ionization energy low while second ionization energy is high because in the first ionization energy it is easy to lose the valencey electron but the second ionization energy result from the breaking up of a completely filled shell .

2- Most of their compounds are ionic: -

They can lose the electrons from their outer most energy level easily to form positive ions which have the same electronic structure of noble gas which preceds it .

3- They are very strong reducing agent because they have a large atomic radius (or volume) and small ionization energy so they lose the electrons from their outer most energy level easily .

4- They are most (soft) metals with low melting and boiling points due to the decreasing in the strength of the metalic bond between atoms since they have only one electron in the outer most energy level .

5- They have a large atomic radius because each element occupied the begining of its period .

6- **Elements of group (1A) are considered of the highest electropositive metals because they can easily lose the valency electron .**

7- Potassium and Caesium are used in photoelectric calls because the atoms of these elements have a large atomic radius and small ionization energy so when they are exposed to light they lose the electrons from their outer most energy level easily .

6- They have characteristic colours when the atom gains an amount of energy which is sufficient to transfer electrons to higher energy levels they give a characteristic colours : dry test

Element	Colour
Lithium	Crimson
Sodium	Golden yellow
Potassium	Pale violet
Calcium	Bluish violet

7- They are kept under liquid hydrocarbons .

Sodium is kept under kerosine because it is a very active metal which can react with air and water so it is stored under kerosine .

8- Action of atmospheric air :

All elements lose their metalic luster because they reacts easily with air to form metal oxide .

* Reaction with nitrogen of air to form (give) lithium nitride .

$$6\,Li + N_2 \longrightarrow 2\,Li_3N$$

G.R.F :

Lithium nitride is used a fertilizer ?

This is Because lithium nitride decomposes when the soil is irrigated giving ammonia (fertilizer) .

$$Li_3N + 3H_2O \longrightarrow NH_3 + 3LiOH$$

9- Reaction with water

$$2\,Na + 2H_2O \longrightarrow 2\,NaOH + H_2 + E$$

Sodium reacts with water forming sodium hydroxide and large amount of energy which is enough to cause the burning of hydrogen evolves with an explosion so sodium fires are not extinguished by water .

10- Reaction with oxygen :

$$4\,Li + O_2 \longrightarrow 2\,Li_2O$$

$$2\,Na + O_2 \longrightarrow Na_2O_2$$

$$2\,K + O_2 \longrightarrow 2\,KO_2$$

Potassium super oxide is used in submarines and aeroplanes in closed atmospheres because it reacts with exhaled carbon dioxide giving oxygen required for breathing :

$$4KO_2 + 2CO_2 \xrightarrow[Cat.]{Cucl_2} 2K_2CO_3 + O_2$$

11- Reaction with acides

$$2Na + 2HCl \longrightarrow 2NaCl + H_2$$

12- Reaction with hydrogen (to form hydrides)

$2Li + H_2 \longrightarrow 2LiH$

$2Na + H_2 \longrightarrow 2NaH$

$NaH \xrightarrow{Electrolysis} Na^+ + H^-$

Go towards cathode ← (Na⁺) — (H⁻) → Go towards anode

N.B : Hydrides are ionic compounds because they produced from the reaction of element with hydrogen such as NaH , LiH .

13- Reaction with halogens :

All elements of group 1A are reacts with halogens forming very stable ionic halides .

$2Na + Cl_2 \longrightarrow 2NaCl$

$2K + Br_2 \longrightarrow 2KBr$

14- Reaction with other non – metal :

$2Na + S \longrightarrow Na_2S$ (Sodium sulphide)

$3K + P \longrightarrow K_3P$ (Potassium phosphate)

15- Action of heat on metal carbonates :

All alkali metals carbonates do not decompose when heated except Lithium carbonate .

$Li_2CO_3 \xrightarrow{Heat} Li_2O + CO_2$

16- Action of heat on metals nitrates :

They decompose partially giving metal nitrite and oxygen

$2NaNO_3 \xrightarrow{\Delta} 2NaNO_2 + O_2$

Sodium nitrate is not used in the manufacture of bombs because a great explosion happens when potassium nitrate decomposes by heat

$2KNO_3 \xrightarrow{\Delta} 2KNO_2 + O_2$

Extraction of metals

Alkali metals are not found in elemental state in nature because these metals are easily to losing their valence electron and oxidized in atmospheric air forming the oxide .

Elements of group (1-A) are extracted from their ores by electrolysis because they strongest reducing agent and can not be reduced from their ores by any reducing agents other than electrolysis .

Anhydride : Compounds which dissolve in water giving acid or alkali .

Commonly used sodium compounds

sodium hydroxide NaOH

a) **preparation in industry :**

by the electrolysis of sodium chloride solution

b)properties:

1- a white hygroscopic solid compound
2- it has a corrosive effect on skin
3- it dissolves easily in water forming an alkaline solution through an exothermic dissolution

1-it react with acids forming the sodium salt of the acid and water

$NaOH + HCL \longrightarrow NaCL + H_2O$

$2NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + 2H_2O$

Uses :

1- NaOH used in many industries as : Soap , synthetic silk and paper
2- it used in purify petrol
3- detection of basic radicals (cations):-

detection of of copper II (Cu^{++})

salt solution + NaOH it gives a blue p.p.t turns black by heating

$CuSO_4 + 2NaOH \longrightarrow Cu(OH)_2 + Na_2SO_4$

$Na_2SO_4 \longrightarrow CuO + H_2O$

Detection of aluminium AL^{3+}

Salt solution + NaOH gives a white p.p.t dissolves in excess of NaOH

$AlCl_3 + 3NaOH \longrightarrow 3NaCl + Al(OH)_3$

$Al(OH)_3 + NaOH \longrightarrow NaALO_2 + H_2O$

1- sodium carbonate Na_2CO_3

the hydrated salt $Na_2CO_3.10H_2O$ is known as washing soda

a) preparation :

1- in laboratory : by passing CO_2 gas through a hot solution of NaOH , the solution is left to cool , white crystal of Na2CO3 are separated
2- in industry : (Solvay method)

$NH_3 + CO_2 + Nacl + H_2O \longrightarrow NaHCO_3 + NH_4Cl$

$2NaHCO_3 \longrightarrow Na_2CO_3 + CO_2 + H_2O$

Properties:

1- white powder , easily dissolves in water . its solution has an alkaline effect
2- it is not affected by heat i.e. it melts without decomposition
3- it react with acid , and CO2 evolves

$Na_2CO_3 + 2HCl \longrightarrow 2Na_2CO_3 + CO_2 + H_2O$

Uses :

1- paper industry
2- water softening
3- textile industry
4- manufacture of glass

Elements of group (5A)

Nitrogen N_7 : non – metal – diatomic – gas in atmospheric air 80% .

Phosphor P_{15} : non – metal – Calcium phosphate ($Ca_3(PO_4)_2$) Apatite $CaF_2Ca_3(PO_4)_2$ (4 atom) .

Arsenic As_{33} : metalloid – Arsenic sulphide As_2S_3 – vapour (4atom As_4)

Antimony Sb_{51} : metalloid–Antimony sulphude Sb_2S_3 – vapour atoms Sb_4

Bismuth Bi_{83} : metal forming a crystal lattice – weak to conduct electricity – vapour (2atom)

General properties

1- **Oxidation number** : Elements of group [5 – A] have several oxidation numbers because they gain electrons from 1 to 3 through covalent sharing or electrons from 1 to 5 electron and reach to the stability state .

2- **With oxygen** : All elements of this group form oxides are acidic (decreases with increasing the atomic number) such as N_2O_3, N_2O_5, P_2O_3, P_2O_5 while other are amphoteric Sb_2O_3 or Bi_2O_3 or basic (increases with increasing the atomic number) Bi_2O_3 .

3- **With hydrogen** : Most of elements of this group reacts with hydrogen to form hydrides such as NH_3 , PH_3 , phosphene , Arsine AsH_3

These compounds (NH_3- PH_3) can form coordinate bonds due to presence of pair of electrons in valence shell so it can give this electrons to the outer atoms or ions to form coordinate bond

$NH_3 + H^+ \longrightarrow NH_4$, $PH_3 + H^+ \longrightarrow PH_4$

These compounds are basic because atom of element has one pair of electrons donated to positive proton of hydrogen which is found in the molecule of water therefore the negative hydroxyl group separated from molecule of water .

$NH_3 + H^+OH^- \longrightarrow NH_4^+ \quad OH^-$

- The polarity of hydrogen compounds in this group decreases with increasing atomic number .

- The thermally stability and the solubility in water are decreases with increasing the atomic in this group (NH_4^+) is more polarity than (PH_4^+) is more polarity than ($AsH_4{}^+$)

Allotropy

It is the presence of the element in more than one form having the same chemical properties but different physical properties .
Both nitrogen (gas) and bismuth (metal) have not allotropic .

Forms :

Solid non - metal	Allotropic forms
Phosphorus	white – red – violet.
Arsenic	black – grey – yellow.
Antimony	yellow – black.



كيفية طباعة صفحات معينة من ملف معين



مثلا ازاى نطبع الصفحات من صفحة 4 الى صفحة 9

خطوة 1

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خطوة 2
اختيار اسم الطابعة بتاعتك

خطوة 3
كتابة الصفحات المراد طباعتها
نكتب رقم 4 ثم نكتب الشرطة دي – ثم نكتب 9

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خطوة 4
اختيار نوع الورق

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خطوة 6

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